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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,105	02/08/2002	Shyam Kutty	IO-1065	1443

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EXAMINER	
HUGHES, SCOTT A	
ART UNIT	**PAPER NUMBER**
3663	

DATE MAILED: 01/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/071,105	KUTTY ET AL.	
	Examiner	Art Unit	
	Scott A Hughes	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-54 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 45-54 is/are allowed.

6)☒ Claim(s) 1-44 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 9/12/03 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to all claims have been considered but are moot in view of the new ground(s) of rejection discussed below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-6, 9-10, 13-16, 18-21, 24-25, 28-29, 32-35, 37, 39, and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouyoucos (US 2004/0013041 A1) in view of Sanchez.

With regard to claim 1, Bouyoucos discloses an array 14 with a first cluster containing at least two acoustic sources 30. He discloses that the longitudinal axes of the sources are substantially orthogonal to a pre-determined direction of towing (paragraph [0032], Figs. 2a, 2b). Bouyoucos discloses at least one protective tube 33 (Fig. 2) enclosing a portion of a supply line between the termination and the acoustic sources. The protective tube would enclose supply lines going to any type of device such as a positioning device, gun controller, or depth measurement device located on the array. Bouyoucos does not disclose that the sources are disposed at a substantially common depth. Sanchez discloses towing an array of sources at a substantially

common depth (Fig. 1). Although Sanchez teaches creating an acoustic signal for use in underwater surveying and Bouyoucos teaches creating a signal for the location of underwater objects as the applicant pointed out in remarks regarding the first office action, it is noted that the way in which the acoustic signals are used does not affect the combination of references in regards to making an air gun source. Since both references teach making an acoustic airgun source, the acoustic signals generated by the sources could be used for all different types of applications including locating underwater objects and performing underwater surveys. Bouyoucos discloses that a vertical type of array disclosed in US application US2004/0013041 A1 could be used for both underwater object location and also for seismic exploration of geophysical layers of the earth (Bouyoucos, WO97/06452, Abstract; Page 6, Lines 10-15). Therefore, it would have been obvious to modify Bouyoucos to utilize the acoustic signal produced for the purposes of an underwater survey as taught by Sanchez. It would have been obvious to modify Bouyoucos to include towing the sources at a substantially common depth as taught by Sanchez in order to form a type of pressure wave that will penetrate an earth formation under the seabed (Sanchez, Column 1, Lines 24-33). The invention taught by Bouyoucos could be modified to include floats connected to the array in order to have the array of airguns line up at a substantially common depth parallel to the surface of the water as shown in Figs. 2,3 of Sanchez. The same arguments for the combinability of Bouyoucos and Sanchez apply to the rest of the claim rejections in this office action.

With regards to claims 2, 15, 19, 25, 29, and 37, Bouyoucos discloses the longitudinal axes of at least two air gun acoustic sources 30 as being parallel to the water surface (paragraph [0032], Figs. 2a, 2b) and perpendicular to the direction of towing (Fig. 19). He does not disclose the axes of the acoustic sources as being perpendicular to the water surface, but since the claim states that the axes of the acoustic sources are "one of (a)generally parallel ... and (b) generally perpendicular.." (emphasis added) the claim is rejected because Bouyoucos discloses the first option of an axis parallel to the water surface.

With regard to claim 3, Bouyoucos discloses a protective tube 33 comprising a coupling 31 (Fig. 2) having a neck portion matable with the acoustic source and a portion adapted to enclose a portion of a supply line 33 (paragraph [0037]). He discloses a coupling as a flexible sleeve 31 (paragraph [0034]).

With regard to claim 4, Bouyoucos discloses at least two air guns 30 (Fig. 2a) in the first cluster.

With regard to claim 5, Bouyoucos discloses air guns having a connection interface for receiving gas, electrical power, and data (paragraphs [0037] and [0039]). He discloses first and second sets of guns with interfaces oriented in different directions in Fig. 7.

With regards to claims 6, 18, 28, and 39 Bouyoucos discloses air guns 30 with connection interfaces for gas, electrical power, and data (paragraphs [0037] and [0039]). He does not disclose have the interfaces oriented in the same direction. Sanchez teaches orienting the interfaces 7 (Fig. 2) in the same direction (Column 3,

Lines 115-35). It would have been obvious to modify Bouyoucos in order to align the interfaces in the same direction in order to fit a different harness configuration or to have a specific configuration of airguns.

With regards to claims 9, 10, 20, 21, 32, 33, 42, and 43 Bouyoucos discloses air guns including ports 307 (Fig. 2c) in a first cluster. He discloses that the ports are aligned along a first plane, said plane being made by the ladder on which the guns are mounted (paragraph [0004]). He further discloses additional ports 307 aligned in a plane parallel to the first plane (Fig. 2a-c). The ports would maintain these parallel planes after the array was rotated 90 degrees from being a vertical array to being a horizontal array.

With regard to claim 13, Sanchez discloses a harness 5 including chains 8 and 8' that absorbs a substantial portion of the tension force during towing (Column 1, Lines 5-15). It would have been obvious to modify Bouyoucos to include a harness as taught by Sanchez in order to take the tension force off of the supply lines as the acoustic source array is being towed.

With regard to claim 14, Bouyoucos does not disclose a harness with a collar associated with each source, nor does he disclose linking members providing a connection between each collar. Sanchez discloses linking members 8 between the sources. It would have been obvious to include the linking members taught by Sanchez with collars on the sources of Bouyoucos in order to provide a mechanical connection between each source.

With regards to claim 16 Bouyoucos discloses at least two air guns 30 in a cluster (Fig. 2).

With regard to claim 24, Bouyoucos discloses towing a plurality of acoustic sources 30 (Fig. 2a) each having a longitudinal axis. He discloses an array having a first cluster formed by aligning the longitudinal axis of each source substantially orthogonal to the direction of towing (Figs. 2a,b). He further discloses enclosing a tubular member 31 over a portion of supply line 33 between a termination and the sources. He does not disclose positioning the sources in a plane generally parallel with the water surface. Sanchez teaches positioning acoustic sources 1 (Fig. 1) along a plane parallel to the water surface (Column 1, Lines 10-25). It would have been obvious to modify Bouyoucos to arrange the acoustic sources in a plane parallel to the water surface as taught by Sanchez in order to form a type of pressure wave that will penetrate an earth formation under the seabed (Sanchez, Column 1, Lines 24-33).

With regard to claim 34, Sanchez teaches connecting the sources 1 (Fig. 2) to a termination A (Fig. 2) that absorbs a substantial portion of the tension force induced during towing (Column 3, Lines 5-15). It would have been obvious to modify Bouyoucos to include connecting the sources to a termination in order to absorb part of the tension force induced by towing.

With regard to claim 35, Sanchez teaches a collar 8 (Fig. 3) linking all each source to the termination. It would have been obvious to modify Bouyoucos to include a collar linking each source to the termination in order to reduce the tension force from towing as taught by Sanchez.

With regards to claim 44 Bouyoucos discloses an acoustic array 14 including at least one cluster of two acoustic sources 30, said sources having a longitudinal axis. He discloses the longitudinal axis of each source as being substantially orthogonal to the direction of towing (Fig. 19). The longitudinal axis would remain orthogonal to the direction of towing after the array was shifted to be parallel to the surface of the water as taught by Sanchez instead of being a vertical array as disclosed in Bouyoucos. Bouyoucos discloses a supply line 33 connected to the acoustic array adapted to convey power and data to the array. He discloses a protective tubing 31 enclosing a part of the supply line. Bouyoucos discloses a harness (paragraph [0004]) that connects to each of the acoustic sources. He also discloses a boat 10 to which the towline is attached. Sanchez discloses sources 1 aligned at a common depth in a plane parallel to the surface of the water. He further discloses a harness 5 that connects to each of the acoustic sources and a termination "A" matable with the supply and the harness. He also discloses a towline connected to the termination for towing the array through water. It would have been obvious to modify Bouyoucos to include aligning the array parallel to the water as taught by Sanchez in order to form a type of pressure wave that will penetrate an earth formation under the seabed (Sanchez, Column 1, Lines 24-33). It would have been obvious to modify Bouyoucos to include a termination matable with the supply and harness, said termination being connected to a tow line, in order to tow the array through the water while the harness absorbs part of the tension force.

Claims 7-8, 17, 26-27, 36, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouyoucos in view of Sanchez as applied to the claims above and further in view of Williams.

With regard to claim 7, 17, 26, 27, 36, and 38, Bouyoucos discloses air guns having a connection interface for receiving gas, electric power, and data. He discloses orienting the interface for a first set of guns in one direction and orienting the faces of a second set of guns in a second direction (Fig. 4a, paragraph [0004]). He does not disclose a connector that mates to the supply line without causing substantial bending of the supply line. Williams teaches a coupling 70 and coupling body 80 (Fig. 3) for connecting cables (Column 4, Lines 17-23). It would have been obvious to modify the connection interface of Bouyoucos to include the connector taught by Williams in order to couple the connection interface to the supply line without causing damage to the supply line.

With regard to claim 8, Williams discloses a coupling with a first shell 72 and second shell 90. It would have been obvious to modify the tube of Bouyoucos to include the first and second shell as taught by Williams in order to couple the tube to the source.

Claims 11-12, 22-23, 30-31, and 40-41are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouyoucos in view of Sanchez as applied to the claims above, and further in view of Nooteboom. Nooteboom teaches equations for calculating the center-to-center spacing of airguns in his "Signature and Amplitude of Linear Airgun

Arrays." It would have been obvious to include using a pre-defined equation as taught by Nooteboom in order to calculate the center-to-center spacing of airguns to be within a certain range in order to produce the desired results.

Allowable Subject Matter

Claims 45-54 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Claim 45 has the limitation in step (c) of "each said longitudinal axis of said sources are substantially orthogonal to a horizontal plane." The prior art did not show an array of acoustic sources with longitudinal axes that were both orthogonal to a direction of towing and orthogonal to a horizontal plane (i.e. the surface of the water).

Claim 50 has the limitation in step (b) part (iii) of "aligning the longitudinal axis of each acoustic source substantially orthogonal to the water surface." The prior art did not show an array of acoustic sources with longitudinal axes that were both orthogonal to a direction of towing and orthogonal to a horizontal plane (i.e. the surface of the water).

Claim 54 has limitation in step (a) part (iii) of "each said longitudinal axis of said sources are substantially orthogonal to the water surface." The prior art did not show an array of acoustic sources with longitudinal axes that were both orthogonal to a direction of towing and orthogonal to a horizontal plane (i.e. the surface of the water).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Desler, who discloses underwater seismic energy sources.

Dolengowski, who discloses a frame for underwater acoustic sources.

Laws, who discloses seismic source arrays.

Duren, who discloses marine source subarrays.

Bouyoucos (6185156 and 5841733).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Hughes whose telephone number is 703-305-0430. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 703-306-4171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH

IAN J. LOBO
PRIMARY EXAMINER